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ABSTRACT

Preschool children from poor families in a black Memphis community, who had shown considerable nutritional progress since a food program was introduced in 1969, lost some of these gains during the 1974-1976 recession. These losses can be attributed to inflation and the high rate of unemployment among the blacks in this community. The unfavorable trends of nutrition indicators demonstrated in this survey of the 1974-1977 period indicate that Federal food assistance programs cannot be relied upon to maintain optimal nutritional conditions among the children of poor families. (Author/EE)

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Report on:

The Nutritional Status of Preschool Children in a Memphis Innercity Area

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THE NUTRITIONAL STATUS OF PRESCHOOL CHILDREN IN A MEMPHIS INNERCITY AREA

MOST SIGNIFICANT FINDING:

Preschool children from poor families in a black Memphis community, who had shown considerable nutritional progress since a food program was introduced in 1969, lost some of these gains during the 1974-1976 recession. The protective effect of the food program appeared to be dependent on the economic condition of the families.

SUMMARY

Since 1969 St. Jude Children's Research Hospital (SJCRH) and the Memphis community organization Memphis Area Project South (MAP-South) have cooperated to better the nutritional health of ghetto children. Considerable improvements have occurred since in this 9 census tract area. In 1976 and early 1977, under sponsorship of the CSA, a nutritional survey of the preschool children was undertaken to re-examine their nutritional health. We feared that the improvements in stunted growth, anemia and vitamin deficiencies could have been negated by inflation and the excessive unemployment in the area.

The SJCRH program addresses itself to the nation-wide lack of knowledge on the nutritional status of poverty children. In 1970 malnutrition was recognized and documented in ten states and its findings resembled those seen in a 1969 SJCRH survey in Memphis. Since, extensive food programs have been implemented but little follow-up information has been available.

The present 1977 survey shows a low incidence of anemia and more children with higher hemoglobin values than before. On the other hand there were more children ($P < 0.01$) seen with smaller stature in 1977 than in 1974. This shift

towards more children in the lower percentiles was never as excessive as in 1969, when half of the children were below the 25th percentile in height (1977: 35%). The children's weight also showed a similar but less pronounced shift towards lighter children.

Deficient vitamin levels also seemed more frequent than in the survey we did 2 years before in the community. Low plasma vitamin C concentrations (below 0.2 mgr%), rarely seen before, now were seen in 6% of the children. Low vitamin A levels (below 20 mcg%) occurred in 39% of the preschoolers compared to 23% before. Riboflavin, or vitamin B_2 activity,was low in 17% of the children and in 20% of 1974 children.

Family interviews showed that by 1977 incomes had increased, the average family size was 4.0 and food stamps provided an average of $177 food value, or $40.00 more than in 1974. Also, more children were now in day-care centers (16% VS 9%) where they received a steady source of nutrition and stimulation. However, this was offset by a consumer food price index increase of 27% and an estimated unemployment rate increase in excess of 20%.

Surveying a random sample of all addresses in the community, we identified 67 families with children under 6 years. We found that only 7% were not eligible for the supplemental food program because of income; of the remainder 43% were participating and 49% were not. The data indicates that most families with children are below the federal poverty line in South Memphis and that the larger families among them were more likely to sign up for the food supplements. The eligible families that did not participate had a higher average income as well as higher hemoglobins and serum iron values. On the other hand their vitamin levels were not different from those benefiting from supplements.

We conclude that considerable improvements have occurred since 1969 in the nutritional health of impoverished children from urban neighborhoods, but

since 1974 some gains have been lost. We believe that inflation and unemployment have contributed to this. The preventive effect of a food program for preschool children in this community appeared to be dependent on the economic condition of the families.

INTRODUCTION

In 1969 a nutritional survey of preschool children was carried out in a nine-tract census area in South Memphis through the cooperation of a black community self-help organization. The survey [1] * documented the presence of growth stunting, anemia and vitamin deficiency for which no other cause could be found than a lack of food. The findings led to a USDA commodity food program for children under six years and pregnant mothers. It was the first program in the nation allowed in a food stamp area.

A survey in 1972 [2] indicated considerable improvements in the heights and weights and a reduction in the incidence of anemia and vitamin deficiency. In a 1974 survey, the nutritional status of the children seemed to have stabelized, but as the economic recession which started in 1973 worsened, the need for a re-survey arose to determine whether it affected the children. On the one hand, the families suffered from rapidly rising unemployment and consumer prices, while on the other hand the children were presumably protected from the nutritional consequences by supplementary foods and adjusted food stamp benefits.

An additional reason for the survey was to update the nutritional information on the children in the community that up till then had justified the preventive use of commodity foods on the basis of family income below the federal poverty guideline.

BACKGROUND

A. The Population

The community, which is almost entirely black, has been organized as Memphis Area Project South, Inc. (MAP-South) since 1964. It presently is a

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* See numbered references in back portion.

Community Action Agency. In 1969, when the supplementary food program was introduced, it was active in a nine census tract area, one of the poorest in the city, with a combined population of 37,250 including 5,008 (13%) children under 6 years of age (1970 census data).[3] Slum leveling has since decreased the population and participation in the food program has dropped from its peak of approximately 4,000 in 1972 to some 2,200 children in 1976. The number of children under 6 in 1975 was estimated at 3,380, or 13% of the 25,317 residents listed in the City Directory.[4]

B. Nutritional Status

In the 1969 survey[1] half of the children were below the 25% percentile for height and weight on the Stuart-Stevenson anthropometric chart.[5] Fifteen percent of the children had head circumferences below the 2nd percentile.[6] Twenty-eight percent of the children under 3 years of age had hemoglobin levels less than 10 gm/100 ml and 25% of the children between 3 and 6 years of age had hemoglobin levels below 11 gm/100 ml. Blood smears, red cell indices and serum iron studies in a smaller subgroup revealed that anemic children under the age of 3 years had evidence of iron deficiency. Bone retardation was found in 27% of the children (bone age less than 75% of chronological age). Vitamin A levels were found to be below 20 mcg/100 ml in 44% of the children although no clinical evidence of vitamin A deficiencies was apparent.

In order to improve nutritional status, a supplementary food program was initiated. The food is donated by the USDA, stored, administered and dispensed by the community warehouse of MAP-South, Inc. and must be picked up monthly. Families in need of supplementary food are identified by MAP-South neighborhood aides who live and work in the community. Medical personnel at St. Jude Hospital authorize the distribution of the food, using the following

criteria to determine eligibility: a) the family must reside in the MAP-South area; b) family income must be below the poverty guidelines of the federal government;[7] and c) the children must be less than 6 years of age. The types and quantities of supplementary food are determined from criteria of the USDA. In addition, since 1970, a prepared infant formula enriched with iron, minerals and vitamins (Similac with iron, Ross Laboratories) has been provided to all newborns in the community for the first 6 months of life. The community warehouse also provides an infant-milk fortefied with iron and vitamins for children below 2 years. Families that find themselves in a crisis are helped with emergency foods when this is indicated. These foods and the infant milk were financed through a CSA Grant (B4B-5492).

In 1972, the MAP-South preschool children then enrolled in the supplemental food program were surveyed again.[2] The results indicated significant improvement in nutritional status over the results from 1969. Only 29% of the heights and 39% of the weights were below the 25th percentile on the Stuart-Stevenson anthropometric grid. The incidence of anemia also decreased significantly from 25% in 1959 to 11% in 1972. However, iron deficiency was present in 53% of the children under 2 years of age and in 37% of those over this age. Plasma vitamin A concentrations were low in 26% of the children compared to 44% in 1969.

In 1974, five years after the nutritional program was started, the MAP-South preschool children showed heights and weights comparable to the Stuart-Stevenson grid. The incidence of anemia (hemoglobin below 10 gm%) had decreased from 25% in 1969,to 11% in 1972,to 8% in 1974. The high prevalence of iron deficiency (27%) as evidenced by low transferrin saturation values in 1972 dropped to 6% in 1974. However, some deficiencies continued to persist. Vitamin

A levels below 20 mcg/100 ml did not significantly change from 1972 values. Riboflavin levels (not measured in previous surveys) indicated a high prevalence of 20% of biochemical riboflavin deficiency among the preschool children; however, no clinical evidence of vitamins A and B_2 deficiencies was apparent.

C. The Recession

During the recent recession, the consumer food price index (1967=100) rose from 139.5 at its onset in 1973 to 177.4 in 1976[8] when we took up the last survey, a 27% increase. In the same time period, the food stamp allotment for a family of four rose only 17%, from $142 to $166.[9] Welfare payments remained at the 1972 level until February 1976 when the grant to a family of four increased 12%, from $132 to $148 per month.[14] Unemployment was always high in the community. In 1970, the only year that such information was available for each census tract,[3] 10.3% of the population in the area was unemployed, or more than 3 times the Shelby County Rate of 3.2%.[10] In 1973, the County rate was 3.8% and peaked at 7% in 1975. It is likely that unemployment in the black community was at least 3 times this rate. An independent survey by MAP-South in December, 1975 indicated that 68% of those willing to work were not.

METHODS AND PROCEDURES

Over a period of 4 months, home visits were made in the fall of 1974 and 1978 by a physician and an assistant. The last survey was concluded in January 1977 and will be referred to as the "1977 survey". After explaining the purpose of the study to the parents, written permission was obtained to examine each preschool child. The child's general medical condition was evaluated. Recumbent length was measured with a metal tape permanently attached to a plank with a fixed headboard. Weights were determined with a portable scale that was standardized with a 25.0 lbs. weight before each examination. Each height and weight was plotted on the appropriate anthropometric percentile grid of Stuart and

and Stevenson.[5] Head circumferences were measured with a plastic tape and plotted on appropriate standard charts.[6]

Capillary blood was obtained for the following tests: (1) hemoglobin concentrations and red and white blood cells counts by Coulter counter, which automatically computes the hematocrit and red blood cell indices; (2) total serum protein content and serum albumin value; (3) vitamin A[11] and C[12] levels.

In 1974 every 12th record of participating families was chosen from the files and a home visit was made. If unsuccessful, an address was taken from a second list of every 24th record. The selection of each series started with a random number under 25 to avoid overlapping. The most frequent reason for substitution was for families moving without leaving an address. Both samples were used and 7 more families were added, taking each 200th record, to round off the total number of children to 300.

In 1977 family records were selected by using a table of random numbers and aiming for a sample of 200 children. This sample resulted in 149 families and 212 children with a successful visit.

In 1977 we also sampled the total preschool population in the area by numbering all addresses in each census tract from the City Directory[4] in the Memphis Public Library using a table of random numbers. From the percentage of children in the 1970 census, annual births and directory entries, it was estimated that 269 selections would provide an adequate sample of 100 children. All were visited; 67 families with 91 children under 6 years were located; at 55 addresses no resonse was obtained despite 3 separate attempts; 1 family refused to cooperate and at the remainder of the addresses there were no children under 6 years, or the location was a business, or vacant.

RESULTS

When comparing the 1977 survey-results to those of 1974, it appears that the incidence of anemia continues to be low (See Table 1). There was also a favorable shift towards higher values among those children that were not anemic. The shift was even more pronounced among non-participants in the food supplement program who also demonstrated other evidence of better iron nutrition (See Table 2), e.g. higher hemoglobin values, serum iron values ($P < 0.01$), transferin saturation percentages ($P < 0.01$), and red cell volume. The children in the 1977 survey also showed a small drop in the prevalence of deficient vitamin B_2 activity from 20% to 17% (Table 3).

Such positive changes were, however, not found among the other nutritional measurements (Table 3). Unacceptable vitamin A levels (below 20 mcg%) were seen in twice as many children in 1977 as in 1974 (50% VS 24%). Deficient levels of vitamin C, which were rarely seen before, increased from 0.6% to 7% of the preschoolers in 1977. Vitamin deficiencies occurred among high and low income groups, food stamp recipients as well as those receiving none, (Table 4 and 5). In 1974 children in the higher income families, or those not using food stamps, had fewer deficiencies. However, by 1977 these advantages were lost.

As Table 6 indicates the heights and weights of the children did also show a significant shift towards smaller children ($P < 0.01$) for both heights and weights. In 1974 there had been insignificant deviations from the expected distribution of growth in normal children ($P = 0.82$ for weights; $P = 0.04$ for heights; Table 6). The evidence of small head circumferences in both surveys was low and stayed the same in both surveys: 5.3% in 1974, 5.4% in 1977.

Some socio-economic information pertaining to food budget, family size and household size are listed in Table 7. A family was defined as the smallest unit which received an income, usually a mother and her children. A household as all living together under one roof and sharing resources; most commonly this was a grandmother, her daughter(s) and families, and sometimes her son(s). As Table 7 shows, in 1977 families had a higher income, spent more cash on food and food stamps, more children went to day-care centers and there seemed to be a trend to smaller families and households. Food stamps did not cover the whole food budget and needed to be augmented by an additional third of their value in cash (34% and 31%, in 1974, 1977, respectively). Although this sum was reported to be for food, it probably included household necessities as well.

In the survey of city addresses, 67 families with children under 6 years were identified; 93% of these families lived under the federal poverty guideline.[7] Approximately half (29) of these eligible families participated in the MAP-South commodity program. Of interest were the 33 families that elected not to take advantage of these supplementary foods although they were eligible to apply for them. Apparently they are more likely to live as small families (median size 3.0, household size, 3.3) rather than as large extended families which was more often the case among the food recipients (median family size, 3.3, household size 6.2). They also used food stamps more frequently (82% VS 71%).

DISCUSSION

Since the documentation of malnutrition in American children during the late sixties,[1,13] considerable improvements were observed with supplementary foods, food stamps and other forms of federal assistance.[2] The unfavorable trends of nutrition-indicators demonstrated in this survey of the 1974-1977 period show that federal food assistance programs cannot be relied upon to maintain optimal nutritional conditions among the children of poverty families.

One reason is that the commodities are intended to supplement foods presumably available to the family through other resources. However, the quanity and quality of these foods is likely to be dependent on income from jobs, welfare, gifts and on food prices. All of these factors were changing unfavorably in the study period. Income of our average family of four (See Table 7) was approximately 40% below the 1974 federal poverty guideline of $458 per month. Welfare payments increased little in these years and unemployment was notoriously high among poor blacks. Another possible reason is that more people than the program was intended for shared the foods.

The fact that deficient vitamin levels occurred irrespective of food supplements, food stamp benefits or income suggests that other factors played a role. Improper food choices made within a narrow budget are one example that may explain why deficiencies persisted among food stamp recipients. In practice one cannot assume that recipients actually use the stamps according to the USDA "thrifty" plan, which assumes, at least theoretically, an adequate diet. It is interesting that nutritional anemia, the most frequent deficiency in poverty children, did not increase. It emphasizes the protective effect of iron fortefied formulas that all children received as infants. This iron provides for the needs of rapid growth in infancy but also for stores that can be utilized over and over again because little is lost.

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TABLE 1. DISTRIBUTION OF HEMOGLOBIN CONCENTRATION

Survey years 1974 and 1977;

supplemented and non-supplemented children

	1974	1977	
Food group	Supplemented	Supplemented	Not Supplemented
Number of Children	300	258	45
Hemoglobin concentrations:		per cent of children	
anemic, below 10 gm%	4.7	4.3	0
low, 10-11 gm%	30.3	18.6	4.4
acceptable, 11.1—12 gm%	42.3	38.3	22.2
acceptable, above 12 gm%	22.7	38.4	73.3

TABLE 2 INDICATORS OF IRON-NUTRITION (MEAN VALUES) IN 1974 AND 1976 SURVEYS

	1974	1977	
Food Group	Supplemented	Supplemented	Not Supplemented
Number of Children	300	258	45
Serum iron, mcg%	96.3	79	93
Total iron binding capacity mcg%	277	206	261
Transferrin saturation, %	36	39	37
Red cell, corpuscular volume, micron^3	75	75	81
corpuscular hemogb., ng	26	26	28

TABLE 3 PREVALENCE OF DEFICIENCIES AMONG PRESCHOOLERS IN 1974 AND 1977 SURVEYS

	1977 SURVEY			1974 SURVEY
Source of Population Sample	City Directory		MAP-S. Files	MAP-S. Files
Food Group:	Not Supplemented	Supplemented	Supplemented	Supplemented
	Per cent of children in each group			
Deficient nutrient *				
vitamin A	34.8	51.1	49.5	24.0
vitamin B_2	34.8	22.2	15.5	20.3
vitamin C	8.7	11.1	7.0	0.6
Number of children	46	45	212	300

* Deficient levels: vitamin A plasma level below 20 mcg%; vitamin C plasma level below 0.2 mg%; vitamin B_2 activity coefficient of red blood cell glutathion reductase exceeding 1.20.

TABLE 4 DISTRIBUTION OF VITAMIN DEFICIENCIES IN LOWER AND UPPER INCOME QUARTILE IN 1974 AND 1977 SURVEYS

	1974		1977	
Per capita income quartile	Upper	Lowest	Upper	Lowest
	Percent of children in each group			
Deficient nutrient *				
vitamin A	16.0	29.3	36.9	40.0
vitamin B_2	18.7	21.3	10.8	12.3
vitamin C	0	8.0	4.6	1.5
Number of children in each group	75	75	65	65

* See footnote, Table 3, for criteria of deficiency

TABLE 5 DISTRIBUTION OF VITAMIN DEFICIENCIES IN IN FOOD STAMP (F.S.) RECIPIENTS AND NON-RECIPIENTS IN 1974 AND 1977 SURVEYS

	1974		1977	
Recipient of food stamps (FS), or not	FS	No FS	FS	No FS
	Percent of children in each group			
Deficient Nutrient *				
vitamin A	23.9	19.5	40.2	39.6
vitamin B_2	21.6	17.1	11.5	8.3
vitamin C	1.8	0	6.7	10.4
No. of children in each group	218	82	209	48

* See footnote, Table 3 for criteria of deficiency

TABLE 6 HEIGHT AND WEIGHT DISTRIBUTION IN

1974 and 1977 SURVEY OF PRESCHOOLERS RECEIVING SUPPLEMENTS

	Weights		Heights	
	Per cent of children			
Boston Grid:	1974	1977	1974	1977
Below 3rd centile	4.4	2.7	5.4	8.5
Below 10th centile	12.1	13.2	14.1	15.9
Below 25th centile	25.9	27.9	26.9	33.7
Below 50th centile	52.4	49.2	54.8	58.9
Below 75th centile	74.5	68.2	78.3	78.7
Below 90th centile	89.9	84.9	94.4	89.6
Below 97th centile	96.9	94.2	98.8	96.6
Significance of deviation from expected distribution	P = 0.82	P < 0.01	P = 0.04	P < 0.01
Total number of children	209	258	298	258

TABLE 7 SOCIO-ECONOMIC INFORMATION (MEAN VALUES) IN 1974 AND 1977 SURVEYS

	1974	1977	
Food	SUPPLEMENTED	SUPPLEMENTED	NOT-SUPPLEMENTED
Number of families	204	178	38
Family size (members)	4.2	4.0	3.8
Household size (members)	7.0	6.4	4.4
Family income ($)	188	292	356
Food stamp cost ($)	40	47	40
Food stamp value ($)	138	177	125
Additional cash for food ($)	47	54	49